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Selected US specifications from IPC sub-class
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(54) Graphics display unit using ultraviolet light

(57) A display device, for example to be used in window displays and other advertising, comprises a housing *f* containing an ultraviolet lamp *g*, having as one wall a display panel consisting of a sheet of glass or plastics *h*, mounted on the back of which are successive sheets *a-d* of transparent acetate film, respectively carrying different patterns or images in different fluorescent pigments, so as to present a composite multi-coloured image when illuminated by the ultraviolet lamp.

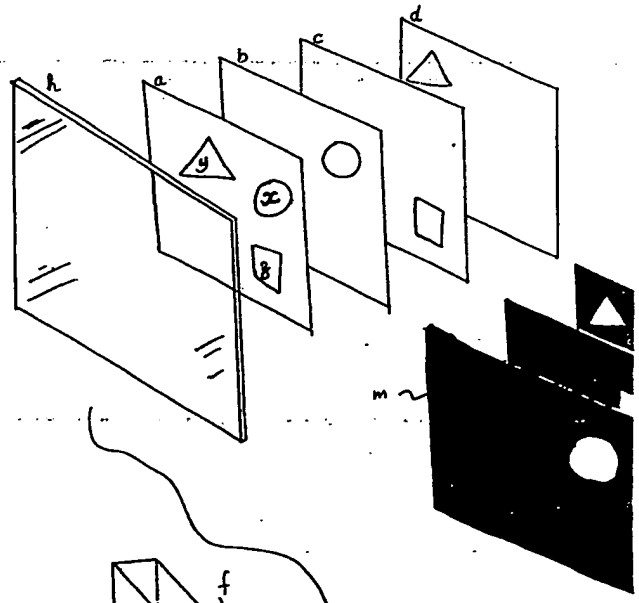

Fig 1.

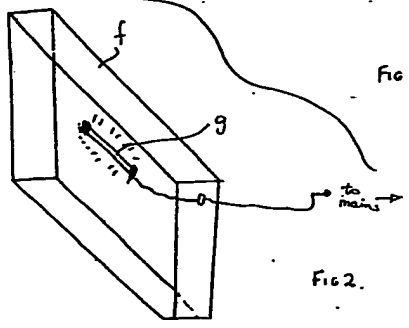

Fig 2.

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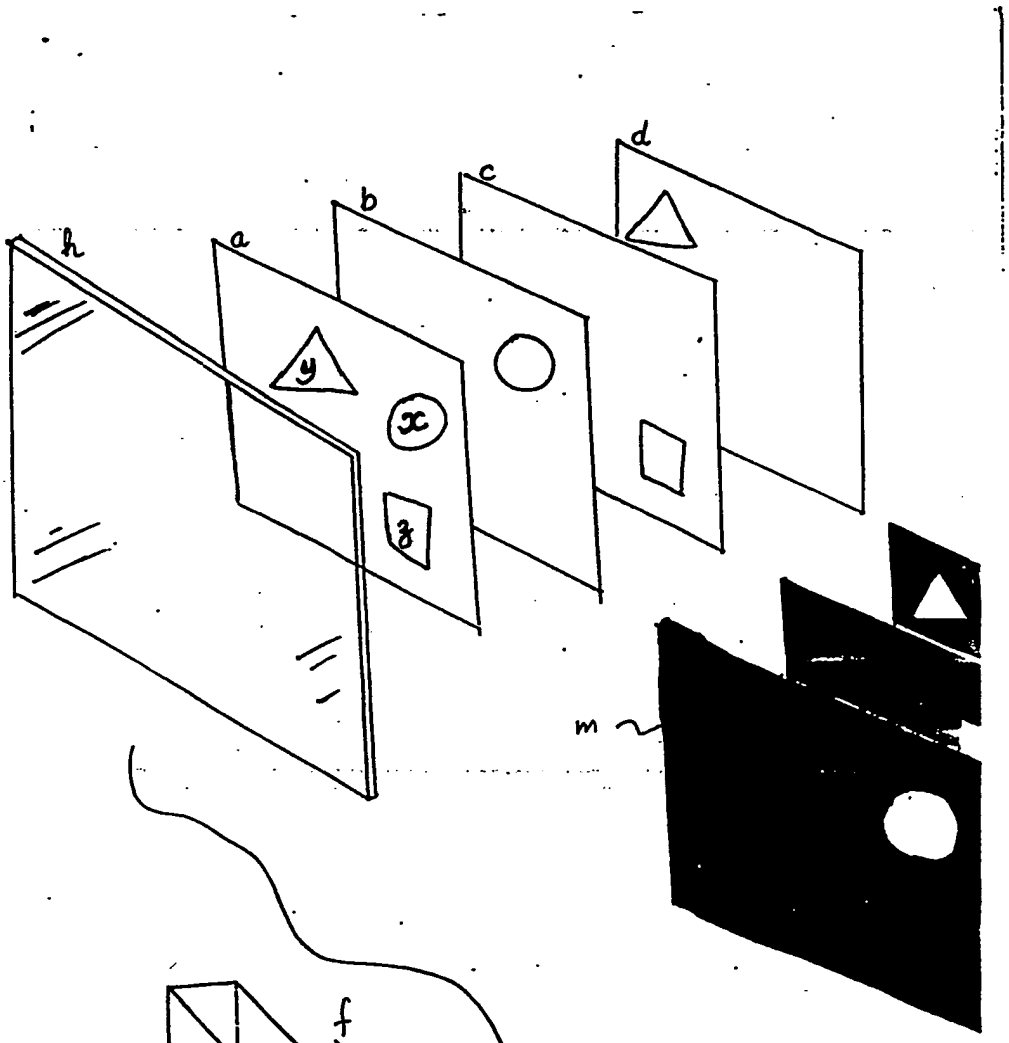

Fig 1.

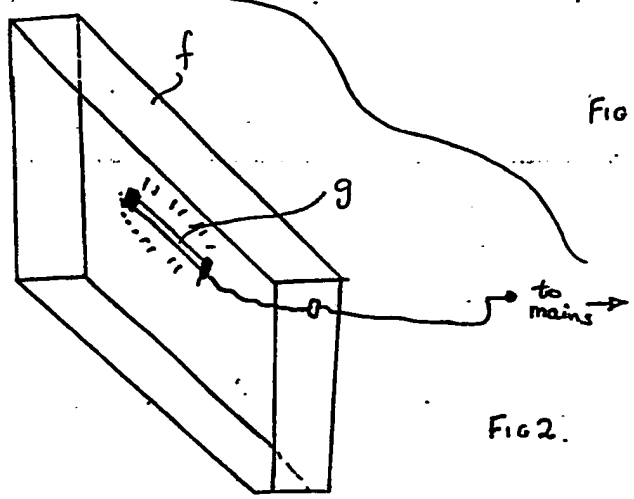

Fig 2.

GRAPHICS DISPLAY UNIT USING ULTRAVIOLET LIGHT

Most illuminated displays in current use are Neon or Argon filled tubes through which electric current is passed and hence made to glow, and known collectively and familiarly as "Neon Signs". Other displays also in common use and found in shop windows, their displays, above their doors and faces of buildings etc. tend to fall into the other category which consist of tinted/coloured sheets of plastic illuminated with normal white fluorescent light.

An object of this invention is to provide a display with a more visually stimulating chromatic luminance, and render possible a wholly greater range of graphic displays from simple typeface to a more complex variety of illustrations and pictures and to offer a whole spectrum of colour.

According to one aspect of the present invention there is an object which is illuminated by the transmission light through it. The light source is of Ultra Violet (U.V.) light, which on passing through the object is transformed to light, of which some at least is in the visible spectrum, by the properties of the paint used.

This object takes the form of a film of acetate (cell), onto which is deposited a thin layer of U.V. sensitive paint. The source of U.V. light is a simple U.V. tube connected to a normal fluorescent tube fitting and powered by mains electricity. Single or multiple layers of cell can be used and overlapped to produce the desired graphics.

Also according to the present invention, there is provided a display device comprising a display panel, at least part of the area of which incorporates or is coated with a fluorescent material, and which has a front surface exposed to view in use and a rear surface, and at least one source of ultraviolet radiation arranged to illuminate the rear surface of the panel for exciting the fluorescent material thereby to emit visible light from the front surface of the panel.

Preferably, said source is or sources are within an enclosure having a said panel forming at least one wall of the enclosure.

The panel may comprise a plurality of individual layers, or the device may comprise a plurality of individual panels one in front of another, respectively providing different responses to the ultra-violet radiation, so as to produce a composite display image for viewing.

It will be understood that the individual layers of panel, with the possible exception of the foremost of these, must be capable of transmitting the ultraviolet radiation from the rear, and the individual layers or panels must be transparent or translucent to visible light so that those to the rear can be seen through those towards the front.

I envisage that in general the fluorescent material will be applied in the form of a paint, ink or the like to selected areas, but it is also possible to use sheet material which is inherently fluorescent or which incorporates one or more fluorescent components, uniformly or in restricted areas.

To comply with safety regulations regarding the dosage of U.V. radiation a U.V. band stop filter may be inserted between the displayed image and the viewer, e.g. in the form of a sheet of suitable material to capture any stray U.V. light.

The present invention is illustrated by the accompanying drawings in which :

Figure 1 shows a composite display panel, and

Figure 2 shows a housing for the display device.

Figure 1 shows a composite display panel comprising four layers each consisting of a film of acetate (cell) a, b, c, d, one behind another, which are mounted onto a substantially rigid transparent or translucent sheet h of Perspex™ or other plastics material, or glass. This forms the front face of the display unit.

Layer a, has an outline or sketch drawing on it, e.g. with a Rotring™ pen using film ink. This is a heavy black ink and is suitably opaque. Once dry the layer a is then reversed and another layer of cell m overlaid on it. Through this second layer one can see which areas one wants to paint say blue, e.g. area x. A mask is painted over all the second cell excepting area x, with a spray of film ink. A similar procedure is used for all other desired colours for areas y, z, etc., and producing masks in each case. The clear sections of the masks are then cut out with a blade. Each mask is then married to a blank cell and the corresponding U.V. paint sprayed on. It should be pointed out here that all the masks can obviously be used with a single cell if either quick drying paint is employed or time is not of the essence.

The mounted display unit made as just described forms the front face of a box or other housing f, the rest of whih is opaque, and which contains an ultraviolet strip

lamp g or other source or sources of ultraviolet radiation.

Since the visible light is generated by fluorescent in the display unit itself, the number and positioning of the basic radiation source are not critical (unlike conventional display devices using visible light as the primary radiation).

More than one surface of the display device may be provided with a fluorescent panel as described, to allow viewing from more than one angle, or to provide a display having different images on different faces.

The described display panel unit is flat, however curved or angular display panels can be used.

Of the range of U.V. sensitive paints, the most effective chromatically would seem to be the vivid "basic" colours. These include yellow, orange, pink, blue, white, and, to a lesser extent, green.

The best images these emulate are either simple text or computer based graphics. Where this would find greatest use would be in the advertising world in the guise, and, in replacement of, "neon signs" as used in shop windows and displays etc. Resembling the glow of television

screens, the present display device can very effectively capture the aura of computer graphic type images, but in a much larger and therefore much more cost-effective manner.

The images or patterns to be displayed can be produced or reproduced for use in the display device, by any convenient manual or automatic technique.

For example, one can translate an image Q, which can be either a sketch, painting, picture, or even printed text straight onto "cell material" (sheets of transparent acetate) by using a technique used in the animation/ cartoon industry, using machine which in essence are large photocopiers into which is fed the transparent film and onto which the images are printed. U.V. sensitive paints can be obtained in amorphous, powdered form and would replace the standard inks normally used. These finished acetate films can then be mounted onto clear glass or Perspex for support.

Alternatively, to produce images by computer, we have at our disposal several techniques to speed production. Firstly, one can merge photographs, text and computer graphics with Desk Top Publishing (D.T.P.) software. Using these and other packages, one can enhance the different aspects, i.e. dimensions, colour, contrast of

the image/text. Then, one can "print" by two suggested formats.

Firstly, using latest printers, e.g. Mitsubishi G-series colour printer, one can get a resolution of 300 dots per inch with 7 basic colours in over 1 million shades, printing on acetate with U.V. sensitive materials.

A second format for printing uses software to do the colour separation electronically. Each monochromatic image is then sent to an ElectroCompositor like the IBM/4250/II which then produces negatives and printing plates. The image is finally constructed by the method described above.

Art, in all forms, including photography, can be transformed to a U.V. display equivalent. Mounting such a display as above and keeping the depth of the housing to a minimum, this technique can be used to produce "posters" which would be self illuminating by transmission and transformation of U.V. to visible light. Such a poster, as opposed to being lit by reflection of visible light as has been done with posters till the present time, could be switched on and used as a "stand-alone" ornament, in a room or hall in which there need not be any other ambient illumination.

CLAIMS:

1. A display device comprising a display panel, at least part of the area of which incorporates or is coated with a fluorescent material, and which has a front surface exposed to view in use and a rear surface, and at least one source of ultraviolet radiation arranged to illuminate the rear surface of the panel for exciting the fluorescent material thereby to emit visible light from the front surface of the panel.

2. A display device as claimed in Claim 1 in which the said source is or sources are within an enclosure having a said panel forming at least one wall of the enclosure.

3. A display device as claimed in Claims 1 or 2 further including an ultraviolet filter at or in front of the front surface of the panel.

4. A display device as claimed in Claims 1, 2 or 3 in which the panel comprises a plurality of layers respectively providing different responses to the ultraviolet radiation for producing a composite display image at the front surface of the panel.

5. A display device as claimed in Claim 4 in which the panel comprises a rigid transparent or translucent sheet

and at least one layer of thin transparent or translucent material mounted onto the said sheet at the rear of said sheet and provided with said fluorescent material.

6. A display device as claimed in Claims 1, 2 or 3 having a plurality of said panels disposed one in front of another and respectively providing different responses to the ultraviolet radiation for producing a composite display image at the outermost panel.

7. A display device as claimed in Claims 4, 5 or 6, in which at least one said layer or panel is provided with at least one opaque region or outline forming a black region or outline in the composite display image.

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